

Claims

1 1. A conductive roller for use in a laser printer,
2 the roller including a solid, thermoset urethane having a
3 hardness of between 30 Shore A and 50 Shore A on cube and a
4 volume resistivity of 1E6 ohm-cm and 9E8 ohm-cm.

1 2. The conductive roller of claim 1, wherein the
2 thermoset urethane has a hardness of between 33 Shore A and
3 45 Shore A on cube.

1 3. The conductive roller of claim 1, wherein the
2 thermoset urethane has a hardness of between 38 Shore A and
3 42 Shore A on roller.

1 4. The conductive roller of claim 1, wherein the
2 thermoset urethane has a volume resistivity of between 3E6
3 ohm-cm and 8E8 ohm-cm.

1 5. The conductive roller of claim 1, wherein the
2 thermoset urethane includes between 0.1% and 2% of the metal
3 salt by weight.

1 6. The conductive roller of claim 1, wherein the
2 metal salt is selected from the group consisting of iron
3 chloride, copper chloride, lithium perchlorate, lithium
4 chloride, lithium bromide, iron bromide, and copper bromide.

1 7. The conductive roller of claim 1, wherein the
2 thermoset urethane is formed from precursors including a
3 polyol and/or polyamine having an equivalent molecular
4 weight of greater than 1500.

1 8. The conductive roller of claim 1, wherein the
2 thermoset urethane is formed from precursors including a
3 polyol and/or polyamine having an equivalent molecular
4 weight of greater than 2000.

1 9. The conductive roller of claim 1, wherein the
2 thermoset urethane does not include a plasticizer.

1 10. The conductive roller of claim 1, wherein the
2 thermoset urethane is formed from precursors including
3 methylene diisocyanate.

1 11. The conductive roller of claim 1, wherein the
2 thermoset urethane is formed from precursors including
3 methylene diisocyanate having an NCO of greater than 20.

1 12. The conductive roller of claim 1, wherein the
2 thermoset urethane exhibits a stable volume resistivity even
3 when the humidity changes from 10% to 90% and the
4 temperature changes from 10°C to 40°C.

1 13. The conductive roller of claim 1, wherein the
2 thermoset urethane further includes a UV light stabilizer.

1 14. The conductive roller of claim 1, wherein the
2 thermoset urethane further includes an antioxidant.

1 15. The conductive roller of claim 1, wherein the
2 thermoset urethane is formed from precursors including a
3 polyol and/or polyamine having an equivalent molecular
4 weight of greater than 1500 and a polyol and/or polyamine
5 having an equivalent molecular weight of less than 110.

1 16. The conductive roller of claim 15, wherein the
2 ratio of polyol and/or polyamine having an equivalent
3 molecular weight of greater than 1500 to the polyol and/or
4 polyamine having an equivalent molecular weight of less than
5 110 is at least 1:1.

1 17. The conductive roller of claim 16, wherein the
2 ratio is between 1.5:1 and 4:1.

1 18. The conductive roller of claim 1, wherein said
2 roller is a charge roller.

1 19. The conductive roller of claim 1, wherein said
2 roller is a developer roller.

1 20. The conductive roller of claim 1, further
2 comprising a rubber coat.

1 21. A method of preparing a roller including a
2 conductive thermoset urethane prepared from urethane
3 precursors including an isocyanate and a polyol and/or a
4 polyamine, comprising
5 fully dissolving a metal seal in the urethane
6 precursor, and
7 curing the urethane precursors in a roller mold to
8 provide a roller including a solid, thermoset urethane
9 having a hardness of between 30 Shore A and 50 Shore A on
10 cube and a volume resistivity of 1E6 ohm-cm and 9E8 ohm-cm,
11 the metal salt being fully dissolved in the thermoset
12 urethane.

1 22. A method of preparing a roller including a
2 conductive, thermoset urethane prepared from urethane
3 precursors including an isocyanate, a first polyol and/or
4 polyamine having an equivalent molecular weight of greater
5 than 1500, and a second polyol and/or polyamine having an
6 equivalent molecular weight of less than 110, the method
7 comprising

8 supplying three streams of liquid to a roller mold,
9 the first stream including the isocyanate, the second stream
10 including the first polyol and/or polyamine, and the third
11 stream including the second polyol and/or polyamine, wherein
12 a metal salt is included in the third stream, and

13 curing the urethane precursors in the roller mold to
14 provide a roller including a thermoset urethane having a
15 hardness of between 30 Shore A and 50 Shore A on cube and a
16 volume resistivity of 1E6 ohm-cm and 9E8 ohm-cm.

1 23. The method of claim 22, wherein the second
2 polyol and/or polyamine has an equivalent molecular weight
3 of greater than 2000.

1 24. The method of claim 22, wherein no plasticizer
2 is included in the thermoset urethane.

1 25. The method of claim 22, wherein the isocyanate
2 include methylene diisocyanate.

1 26. The method of claim 25, wherein the methylene
2 diisocyanate has an NCO of greater than 20.

1 27. A laser printer including a photoconductor drum
2 and a developer roller that transfers toner to the
3 photoconductor drum during printing, wherein the developer
4 roller includes a solid, thermoset urethane including a
5 metal salt and having a hardness of between 30 Shore A and
6 50 Shore A on cube and a volume resistivity of 1E6 ohm-cm
7 and 9E8 ohm-cm.

1 28. A laser printer including a photoconductor drum
2 and a charge roller that charges the photoconductor drum,
3 wherein the charge roller includes a solid, thermoset
4 urethane including a metal salt and having a hardness of
5 between 30 Shore A and 50 Shore A on cube and a volume
6 resistivity of 1E6 ohm-cm and 9E8 ohm-cm.